

5

20. The NMR gyro of claim 19, wherein the feedthroughs provide both an electrical and a mechanical connection to an external device.

21. The NMR gyro of claim 20, wherein the feedthroughs are disposed in a substantially circular pattern.

22. An NMR gyro comprising:

a substantially cylindrical enclosure formed from HyMu 80 alloy;

a ceramic support having four legs extending outward from a substantially circular central portion, the ceramic support affixed within the enclosure;

an NMR cell suspending in vacuum and affixed to the ceramic support;

four substantially cylindrical permanent magnets disposed approximately equidistant from the cell, the permanent magnets being disposed at the vertices of a square having the cell at its center;

a single-turn magnetic field coil disposed to produce a modulated magnetic field transverse to a magnetic field produced by the permanent magnets;

a cell heater that maintains cell temperature at about 100 degrees C.; and

at least one pump VCSEL affixed to the ceramic support.

23. The NMR gyro of claim 22, wherein the pump VCSEL forms at least a part of an integrated circuit that includes a detector.

24. The NMR gyro of claim 23, wherein the NMR cell includes a mirrored region disposed oppositely from the VCSEL.

25. The NMR gyro of claim 22, wherein light from the VCSEL is circularly polarized by a quarter-wave plate interposed between the VCSEL and the NMR cell.

26. The NMR gyro of claim 22, further comprising a second VCSEL disposed orthogonally with respect to the pump VCSEL.

6

27. The NMR gyro of claim 26, wherein light output from the VCSELs is tuned to an absorption wavelength of alkali metal within the NMR cell.

28. The NMR gyro of claim 27, wherein the VCSELs are tuned by adjusting VCSEL temperature.

29. The NMR gyro of claim 27, wherein the VCSELs are tuned by adjusting supply current provided to the VCSELs.

30. The NMR gyro of claim 29, further comprising a circuit board including control circuitry for the VCSELs.

31. The NMR gyro of claim 30, further comprising a plurality of feedthroughs disposed about an exterior surface of the enclosure, the feedthroughs providing electrical connection paths from the enclosure exterior to the circuit board.

32. The NMR gyro of claim 31, wherein the feedthroughs provide both an electrical and a mechanical connection to an external device.

33. The NMR gyro of claim 26, wherein the NMR gyro is fabricated in a batch process with a wafer structure comprising:

a centrally disposed micro NMR cell wafer disposed between top and bottom lid wafers;

a detector wafer adjacent the NMR cell wafer;

an electronics wafer including detection and signal processing electronics adjacent the detector wafer;

a polarizer wafer adjacent the NMR cell wafer on a side opposite the detector wafer;

an optics wafer adjacent the polarizer wafer;

a laser wafer including readout and pump VCSELs adjacent the optics wafer; and

a source control electronics wafer adjacent the laser wafer.

* * * * *